

1           50.     A magnetic recording head for writing multiple data tracks onto a  
2 magnetic media traveling across the head in a media direction, the head comprising a plurality  
3 of thin film write elements, each element having a front region defining a gap and a back  
4 region admitting loops of a conductive coil, a portion of each loop normal to the media  
5 direction, each gap aligned along a position line, the yokes alternately positioned such that a  
6 first plurality of write elements has each back region on a first side of the position line and a  
7 second plurality of write elements has each back region on a second side of the position line  
8 opposite the first side.

1           51.     A magnetic recording head as in claim 50 wherein the write elements  
2 are formed on a common substrate.

A 1           52.     A magnetic recording head as in claim 50 wherein each write element  
2 is operative to inductively sense field patterns written onto a data track.

1           53.     A magnetic recording head as in claim 50 wherein each write element  
2 contains a read element within the yoke beneath the gap.

1           54.     A magnetic recording head as in claim 53 wherein each yoke comprises  
2 an upper section and a lower section separated in a portion of the yoke under the gap by an  
3 insulating layer containing the read element.

1           55.     A magnetic recording head as in claim 53 wherein the read element is  
2 a flux sensing read element.

1           56.     A magnetic recording head as in claim 50 wherein the position line is  
2 normal to the media direction.

1           57.     A magnetic recording head as in claim 50 wherein the position line  
2 forms an acute angle with the media direction.

1                   58.     A magnetic recording head as in claim 50 wherein each gap has a gap  
2 angle with the position line, each write element gap angle opposite in sign from the gap angle  
3 of the gap on an adjacent write element.

1                   59.     A magnetic recording head as in claim 50 wherein the magnetic media  
2 is magnetic tape.

1                   60.     A magnetic recording head as in claim 50 further comprising at least  
2 one additional plurality of write elements, each additional plurality of write elements having  
3 an associated position line, each write element in the at least one additional plurality of write  
4 elements having a gap substantially aligned along the associated position line.

1                   61.     A magnetic recording head as in claim 60 wherein each write element  
2 gap has a gap angle with the associated position line, each gap operative to write a data track  
3 on the magnetic media, each write element gap angle opposite in sign from the gap angle of  
4 a gap operative to write an adjacent data track.

1                   62.     A magnetic recording head for writing multiple tracks onto magnetic  
2 media traveling across the recording head, the recording head comprising a plurality of thin  
3 film write elements, each write element comprising a yoke having a back region and a front  
4 region extending from the back region when viewed in a plane parallel to the magnetic media,  
5 the front region forming a gap and the back region admitting loops of a conductive coil, a  
6 portion of each loop normal to media traveling across the recording head, wherein a position  
7 line extends across the plane and intersects the projection of each track onto the plane and  
8 wherein the write elements are arranged with the yoke front regions aligned across the position  
9 line and the yoke back regions in a first plurality of write elements lying on a first side of the  
10 position line and a second plurality of write elements lying on a second side of the position line  
11 opposite of the first side.

1                   63.     A magnetic recording head as in claim 62 wherein each gap is a thin  
2 opening across the yoke front region in the plane, the thin opening defining an associated gap  
3 axis through the longest portion of the gap, each gap formed at a gap angle between the  
4 position line and the associated gap axis, wherein the gap angle magnitude is the same for each  
5 write element and the gap angle sign is opposite between adjacent write elements.

1                   64.     A magnetic recording head as in claim 62 wherein each write element  
2 is operative to inductively sense field patterns written onto a track on the magnetic media.

1                   65.     A magnetic recording head as in claim 62 wherein each write element  
2 further comprises a read element located within the yoke front region beneath the gap.

1                   66.     A magnetic recording head as in claim 62 wherein the yoke width tapers  
2 gradually from the back region to the front region narrower than the back region.

1                   67.     A magnetic recording head as in claim 62 further comprising at least  
2 one additional plurality of write elements, each additional plurality of write elements having  
3 an associated position line, each write element in the at least one additional plurality of write  
4 elements having a gap substantially aligned along the associated position line.

1                   68.     A magnetic recording head as in claim 67 wherein each gap is a thin  
2 opening across the yoke front region in the plane, the thin opening defining an associated gap  
3 axis through the longest portion of the gap, each gap formed at a gap angle between the  
4 position line and the associated gap axis, wherein the gap angle magnitude is the same for each  
5 write element and the gap angle sign is opposite between write elements operative to write  
6 adjacent data tracks.

1                   69.     A magnetic recording head as in claim 62 wherein the position line is  
2 normal to the direction the magnetic media travels across the recording head.

1                   70.     A magnetic recording head as in claim 62 wherein the position line is  
2     at an acute angle with the direction magnetic media travels across the recording head.

1                   71.     A magnetic recording head for writing multiple data tracks onto  
2     magnetic media traveling in a media direction over the head, the head including a plurality of  
3     write elements, each write element comprising:

4                   a substrate parallel to the magnetic media as the magnetic media travels by the  
5     head;

6                   a first magnetic layer deposited on a portion of the substrate, the first magnetic  
7     layer forming a lower section of a yoke;

8                   an insulating layer deposited over a center portion of the yoke lower section;

A 9                   a second magnetic layer deposited over the insulating layer and the portions of  
10     the yoke lower section not covered by the insulating layer, the second magnetic layer forming  
11     an upper section of the yoke, the yoke upper section having a back region and a front region  
12     extending from the back region, the yoke upper section front region defining a gap; and

13                   a conductive coil comprising a plurality of loops, each loop having a portion  
14     passing within the yoke such that at least a portion of each loop is normal to the substrate;

15                   wherein the gap of each write element is aligned along a position line, the yokes  
16     alternately positioned such that a first plurality of write elements has each back region on a  
17     first side of the position line and a second plurality of write elements has each back region on  
18     a second side of the position line opposite the first side.

1                   72.     A magnetic recording head as in claim 71 wherein each loop of the  
2     conductive coil encircles the yoke lower section such that at least one portion of each loop  
3     passes below the yoke lower section.

1                   73.     A magnetic recording head as in claim 71 wherein each loop of the  
2     conductive coil encircles the yoke upper section such that at least one portion of each loop  
3     passes above the yoke upper section.

1                   74.     A magnetic recording head as in claim 71, each write element having  
2 an orientation direction defined by a line from the yoke back region to the yoke front region,  
3 wherein each write element has at least one adjacent write element having the opposite  
4 orientation direction.

1                   75.     A magnetic recording head as in claim 74 wherein the front region of  
2 each write element yoke upper section is adjacent to the yoke upper section front region of the  
3 at least one neighboring write element.

A 1                   76.     A magnetic recording head as in claim 75, the gap comprising a thin slit  
2 across the yoke upper section front region at a gap angle relative to the written data track,  
3 wherein the gap angle of each write element is different than the gap angle of the at least one  
4 neighboring write element.

1                   77.     A magnetic recording head as in claim 71 wherein each write element  
2 is operative to inductively sense field patterns written onto a magnetic media data track.

1                   78.     A magnetic recording head as in claim 71 wherein the yoke upper  
2 section front region is located a greater distance from the substrate than the yoke upper section  
3 back region.

1                   79.     A magnetic recording head as in claim 78 further comprising a read  
2 element located in the insulating layer beneath the gap in the yoke upper section front region.

1                   80.     A magnetic recording head as in claim 79 wherein the read element is  
2 a magnetoresistive read element.

1                   81.     A magnetic recording head as in claim 71 wherein the yoke upper  
2 section back region gradually tapers to the width of the narrower yoke upper section front  
3 region.

- 1                    82.     A magnetic recording head as in claim 71 wherein the magnetic media  
2     is magnetic tape.
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